

Electricity and Magnetism, Chinese TAIPEI, CMS (Center for Measurement Standards)

| Calibration or Measurement Service | | | Measurand Level or Range | | | Measurement Conditions/Independent Variable | | Expanded Uncertainty | | | | Matrix uncertainty | NMI Service Identifier | |
|--|---|--|--------------------------|---------------|-------|---|----------------|----------------------|-------|-----------------|---------------------|---|------------------------|----|
| Quantity | Instrument or Artifact | Instrument Type or Method | Minimum value | Maximum value | Units | Parameter | Specifications | Value | Units | Coverage Factor | Level of Confidence | Is the expanded uncertainty a relative one? | | |
| DC voltage sources: single values | Solid state voltage standard | Comparison | 1.018 | 1.018 | V | | | 0.09 | µV | 2.2 | 95% | No | | 1 |
| DC voltage sources: single values | Solid state voltage standard | Comparison | 10 | 10 | V | | | 0.24 | µV | 2.2 | 95% | No | | 2 |
| DC voltage sources: single values | Solid state voltage standard | Difference measurement | 1 | 1 | V | | | 0.3 | µV/V | 2.13 | 95% | Yes | | 3 |
| DC voltage sources: single values | Standard cell, solid state voltage standard | Difference measurement | 1.018 | 1.018 | V | | | 0.3 | µV/V | 2.13 | 95% | Yes | | 4 |
| DC voltage sources: single values | Solid state voltage standard | Difference measurement | 10 | 10 | V | | | 0.3 | µV/V | 2.13 | 95% | Yes | | 5 |
| DC voltage sources: low values (<= 10 V) | DC voltage source, multifunction calibrator | Comparison with standard via resistive divider | 1 | 1 | mV | | | 0.6 | mV/V | 2 | 95% | Yes | | 6 |
| DC voltage sources: low values (<= 10 V) | DC voltage source, multifunction calibrator | Comparison with standard via resistive divider | 10 | 10 | mV | | | 0.06 | mV/V | 2 | 95% | Yes | | 7 |
| DC voltage sources: low values (<= 10 V) | DC voltage source, multifunction calibrator | Comparison with standard via resistive divider | 100 | 100 | mV | | | 6 | µV/V | 2 | 95% | Yes | | 8 |
| DC voltage sources: low values (<= 10 V) | DC voltage source, multifunction calibrator | Comparison with standard via resistive divider | 1 | 1 | V | | | 0.8 | µV/V | 2 | 95% | Yes | | 9 |
| DC voltage sources: low values (<= 10 V) | DC voltage source, multifunction calibrator | Comparison with standard via resistive divider | 10 | 10 | V | | | 0.4 | µV/V | 2 | 95% | Yes | | 10 |
| DC voltage sources: intermediate values (> 10 V to 1100 V) | DC voltage source, multifunction calibrator | Comparison with standard via resistive divider | 100 | 100 | V | | | 0.8 | µV/V | 2 | 95% | Yes | | 11 |

Calibration and Measurement Capabilities

| Calibration or Measurement Service | | | Measurand Level or Range | | | Measurement Conditions/Independent Variable | | Expanded Uncertainty | | | | | Matrix uncertainty | NMI Service Identifier |
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| Quantity | Instrument or Artifact | Instrument Type or Method | Minimum value | Maximum value | Units | Parameter | Specifications | Value | Units | Coverage Factor | Level of Confidence | Is the expanded uncertainty a relative one? | | |
| DC voltage sources: intermediate values (> 10 V to 1100 V) | DC voltage source, multifunction calibrator | Comparison with standard via resistive divider | 1000 | 1000 | V | | | 6 | µV/V | 2 | 95% | Yes | | 12 |
| DC voltage meters: very low values (<= 1 mV) | DC voltmeter, multimeter | Direct measurement | 1 | 1 | mV | | | 0.6 | mV/V | 2 | 95% | Yes | | 13 |
| DC voltage meters: intermediate values (> 1 mV to 1100 V) | DC voltmeter, multimeter | Direct measurement | 10 | 10 | mV | | | 0.06 | mV/V | 2 | 95% | Yes | | 14 |
| DC voltage meters: intermediate values (> 1 mV to 1100 V) | DC voltmeter, multimeter | Direct measurement | 100 | 100 | mV | | | 6 | µV/V | 2 | 95% | Yes | | 15 |
| DC voltage meters: intermediate values (> 1 mV to 1100 V) | DC voltmeter, multimeter | Direct measurement | 1 | 1 | V | | | 0.8 | µV/V | 2 | 95% | Yes | | 16 |
| DC voltage meters: intermediate values (> 1 mV to 1100 V) | DC voltmeter, multimeter | Direct measurement | 10 | 10 | V | | | 0.4 | µV/V | 2 | 95% | Yes | | 17 |
| DC voltage meters: intermediate values (> 1 mV to 1100 V) | DC voltmeter, multimeter | Direct measurement | 100 | 100 | V | | | 0.8 | µV/V | 2 | 95% | Yes | | 18 |
| DC voltage meters: intermediate values (> 1 mV to 1100 V) | DC voltmeter, multimeter | Direct measurement | 1000 | 1000 | V | | | 6 | µV/V | 2 | 95% | Yes | | 19 |
| DC resistance standards and sources: low values (<= 1 Ω) | Fixed resistor | DCC Bridge | 0.0001 | 0.0001 | Ω | | | 31 | µΩ/Ω | 2 | 95% | Yes | | 20 |
| DC resistance standards and sources: low values (<= 1 Ω) | Fixed resistor | DCC Bridge | 0.001 | 0.001 | Ω | Oil bath temperature | (25 ± 0.005) °C | 3.3 | µΩ/Ω | 2 | 95% | Yes | | 21 |
| DC resistance standards and sources: low values (<= 1 Ω) | Fixed resistor | DCC Bridge | 0.01 | 0.01 | Ω | Oil bath temperature | (25 ± 0.005) °C | 2.7 | µΩ/Ω | 2 | 95% | Yes | | 22 |

Calibration and Measurement Capabilities

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|--|------------------------|---------------------------|--------------------------|---------------|------------------|---|--------------------------------|----------------------|--------------------|-----------------|---------------------|---|--------------------|------------------------|
| Quantity | Instrument or Artifact | Instrument Type or Method | Minimum value | Maximum value | Units | Parameter | Specifications | Value | Units | Coverage Factor | Level of Confidence | Is the expanded uncertainty a relative one? | | |
| DC resistance standards and sources: low values ($\leq 1 \Omega$) | Fixed resistor | DCC Bridge | 0.1 | 0.1 | Ω | Oil bath temperature | $(25 \pm 0.005)^\circ\text{C}$ | 1.9 | $\mu\Omega/\Omega$ | 2 | 95% | Yes | | 23 |
| DC resistance standards and sources: low values ($\leq 1 \Omega$) | Fixed resistor | CCC Bridge | 1 | 1 | Ω | Oil bath temperature | $(25 \pm 0.005)^\circ\text{C}$ | 0.02 | $\mu\Omega/\Omega$ | 2 | 95% | Yes | | 24 |
| DC resistance standards and sources: low values ($\leq 1 \Omega$) | Fixed resistor | DCC Bridge | 1 | 1 | Ω | Oil bath temperature | $(25 \pm 0.005)^\circ\text{C}$ | 0.18 | $\mu\Omega/\Omega$ | 2 | 95% | Yes | | 25 |
| DC resistance standards and sources: intermediate values ($> 1 \Omega$ to $1 \text{ M}\Omega$) | Fixed resistor | DCC Bridge | 10 | 10 | Ω | Oil bath temperature | $(25 \pm 0.005)^\circ\text{C}$ | 0.18 | $\mu\Omega/\Omega$ | 2 | 95% | Yes | | 26 |
| DC resistance standards and sources: intermediate values ($> 1 \Omega$ to $1 \text{ M}\Omega$) | Fixed resistor | DCC Bridge | 100 | 100 | Ω | Oil bath temperature | $(25 \pm 0.005)^\circ\text{C}$ | 0.18 | $\mu\Omega/\Omega$ | 2 | 95% | Yes | | 27 |
| DC resistance standards and sources: intermediate values ($> 1 \Omega$ to $1 \text{ M}\Omega$) | Fixed resistor | DCC Bridge | 1 | 1 | $\text{k}\Omega$ | Oil bath temperature | $(25 \pm 0.005)^\circ\text{C}$ | 0.19 | $\mu\Omega/\Omega$ | 2 | 95% | Yes | | 28 |
| DC resistance standards and sources: intermediate values ($> 1 \Omega$ to $1 \text{ M}\Omega$) | Fixed resistor | DCC Bridge | 10 | 10 | $\text{k}\Omega$ | Oil bath temperature | $(25 \pm 0.005)^\circ\text{C}$ | 0.2 | $\mu\Omega/\Omega$ | 2 | 95% | Yes | | 29 |
| DC resistance standards and sources: intermediate values ($> 1 \Omega$ to $1 \text{ M}\Omega$) | Fixed resistor | Difference measurement | 100 | 100 | $\text{k}\Omega$ | Oil bath temperature | $(25 \pm 0.005)^\circ\text{C}$ | 5 | $\mu\Omega/\Omega$ | 2 | 95% | Yes | | 30 |
| DC resistance standards and sources: intermediate values ($> 1 \Omega$ to $1 \text{ M}\Omega$) | Fixed resistor | Difference measurement | 1 | 1 | $\text{M}\Omega$ | Oil bath temperature | $(25 \pm 0.005)^\circ\text{C}$ | 8 | $\mu\Omega/\Omega$ | 2 | 95% | Yes | | 31 |
| DC resistance standards and sources: high values ($> 1 \text{ M}\Omega$) | Fixed resistor | Difference measurement | 10 | 10 | $\text{M}\Omega$ | Oil bath temperature | $(25 \pm 0.005)^\circ\text{C}$ | 12 | $\mu\Omega/\Omega$ | 2 | 95% | Yes | | 32 |

Calibration and Measurement Capabilities

| Calibration or Measurement Service | | | Measurand Level or Range | | | Measurement Conditions/Independent Variable | | Expanded Uncertainty | | | | | Matrix uncertainty | NMI Service Identifier |
|--|------------------------|---------------------------|--------------------------|---------------|------------------|---|-------------------------------|----------------------|-------------------------|-----------------|---------------------|---|--------------------|------------------------|
| Quantity | Instrument or Artifact | Instrument Type or Method | Minimum value | Maximum value | Units | Parameter | Specifications | Value | Units | Coverage Factor | Level of Confidence | Is the expanded uncertainty a relative one? | | |
| DC resistance standards and sources: high values ($> 1 \text{ M}\Omega$) | Fixed resistor | Difference measurement | 100 | 100 | $\text{M}\Omega$ | Air bath temperature | $(23 \pm 0.03)^\circ\text{C}$ | 0.09 | $\text{m}\Omega/\Omega$ | 2.4 | 95% | Yes | | 33 |
| DC resistance standards and sources: high values ($> 1 \text{ M}\Omega$) | Fixed resistor | Difference measurement | 1 | 1 | $\text{G}\Omega$ | Air bath temperature | $(23 \pm 0.03)^\circ\text{C}$ | 0.07 | $\text{m}\Omega/\Omega$ | 2 | 95% | Yes | | 34 |
| DC resistance standards and sources: high values ($> 1 \text{ M}\Omega$) | Fixed resistor | Difference measurement | 10 | 10 | $\text{G}\Omega$ | Air bath temperature | $(23 \pm 0.03)^\circ\text{C}$ | 0.22 | $\text{m}\Omega/\Omega$ | 2 | 95% | Yes | | 35 |
| DC resistance standards and sources: high values ($> 1 \text{ M}\Omega$) | Fixed resistor | Difference measurement | 100 | 100 | $\text{G}\Omega$ | Air bath temperature | $(23 \pm 0.03)^\circ\text{C}$ | 0.28 | $\text{m}\Omega/\Omega$ | 2 | 95% | Yes | | 36 |
| DC resistance standards and sources: high values ($> 1 \text{ M}\Omega$) | Fixed resistor | Difference measurement | 1 | 1 | $\text{T}\Omega$ | Air bath temperature | $(23 \pm 0.03)^\circ\text{C}$ | 0.4 | $\text{m}\Omega/\Omega$ | 2 | 95% | Yes | | 37 |
| DC resistance standards and sources: standards for high current | DC shunt | Voltage drop across shunt | 100 | 1000 | A | | | 0.4 | mA/A | 2 | 95% | Yes | | 38 |
| DC resistance meters: low values ($\leq 1 \Omega$) | Microohmmeter | Direct measurement | 0.0001 | 0.0001 | Ω | | | 10 | $\text{m}\Omega/\Omega$ | 2 | 95% | Yes | | 39 |
| DC resistance meters: low values ($\leq 1 \Omega$) | Multimeter | Direct measurement | 0.001 | 0.001 | Ω | | | 10 | $\text{m}\Omega/\Omega$ | 2 | 95% | Yes | | 40 |
| DC resistance meters: low values ($\leq 1 \Omega$) | Multimeter | Direct measurement | 0.01 | 0.01 | Ω | | | 3 | $\text{m}\Omega/\Omega$ | 2 | 95% | Yes | | 41 |
| DC resistance meters: low values ($\leq 1 \Omega$) | Multimeter | Direct measurement | 0.1 | 0.1 | Ω | | | 0.2 | $\text{m}\Omega/\Omega$ | 2 | 95% | Yes | | 42 |
| DC resistance meters: low values ($\leq 1 \Omega$) | Multimeter | Direct measurement | 1 | 1 | Ω | | | 6 | $\mu\Omega/\Omega$ | 2 | 95% | Yes | | 43 |

Calibration and Measurement Capabilities

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| Quantity | Instrument or Artifact | Instrument Type or Method | Minimum value | Maximum value | Units | Parameter | Specifications | Value | Units | Coverage Factor | Level of Confidence | Is the expanded uncertainty a relative one? | | |
| DC resistance meters: intermediate values (> 1 Ω to 1 GΩ) | Multimeter | Direct measurement | 10 | 10 | Ω | | | 1 | μΩ/Ω | 2 | 95% | Yes | | 44 |
| DC resistance meters: intermediate values (> 1 Ω to 1 GΩ) | Multimeter | Direct measurement | 100 | 100 | Ω | | | 0.2 | μΩ/Ω | 2 | 95% | Yes | | 45 |
| DC resistance meters: intermediate values (> 1 Ω to 1 GΩ) | Multimeter | Direct measurement | 1 | 1 | kΩ | | | 0.2 | μΩ/Ω | 2 | 95% | Yes | | 46 |
| DC resistance meters: intermediate values (> 1 Ω to 1 GΩ) | Multimeter | Direct measurement | 10 | 10 | kΩ | | | 0.2 | μΩ/Ω | 2 | 95% | Yes | | 47 |
| DC resistance meters: intermediate values (> 1 Ω to 1 GΩ) | Multimeter | Direct measurement | 100 | 100 | kΩ | | | 5 | μΩ/Ω | 2 | 95% | Yes | | 48 |
| DC resistance meters: intermediate values (> 1 Ω to 1 GΩ) | Multimeter | Direct measurement | 1 | 1 | MΩ | | | 8 | μΩ/Ω | 2 | 95% | Yes | | 49 |
| DC resistance meters: intermediate values (> 1 Ω to 1 GΩ) | Multimeter | Direct measurement | 10 | 10 | MΩ | | | 12 | μΩ/Ω | 2 | 95% | Yes | | 50 |
| DC resistance meters: intermediate values (> 1 Ω to 1 GΩ) | Multimeter, teraohmmeter | Direct measurement | 100 | 100 | MΩ | | | 0.09 | mΩ/Ω | 2.4 | 95% | Yes | | 51 |
| DC resistance meters: intermediate values (> 1 Ω to 1 GΩ) | Multimeter, teraohmmeter | Direct measurement | 1 | 1 | GΩ | | | 0.07 | mΩ/Ω | 2 | 95% | Yes | | 52 |
| DC resistance meters: high values (> 1 GΩ) | Teraohmmeter | Direct measurement | 10 | 10 | GΩ | | | 0.22 | mΩ/Ω | 2 | 95% | Yes | | 53 |
| DC resistance meters: high values (> 1 GΩ) | Teraohmmeter | Direct measurement | 100 | 100 | GΩ | | | 0.28 | mΩ/Ω | 2 | 95% | Yes | | 54 |
| DC resistance meters: high values (> 1 GΩ) | Teraohmmeter | Direct measurement | 1 | 1 | TΩ | | | 0.4 | mΩ/Ω | 2 | 95% | Yes | | 55 |
| DC current sources: low values (<= 0.1 mA) | Current generator | Comparison | 10 | 10 | pA | | | 29 | mA/A | 1.96 | 95% | Yes | | 56 |

Calibration and Measurement Capabilities

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|--|---|---------------------------------------|--------------------------|---------------|-------|---|----------------|----------------------|-------|-----------------|---------------------|---|------------------------|----|
| Quantity | Instrument or Artifact | Instrument Type or Method | Minimum value | Maximum value | Units | Parameter | Specifications | Value | Units | Coverage Factor | Level of Confidence | Is the expanded uncertainty a relative one? | | |
| DC current sources: low values (<= 0.1 mA) | Current generator | Comparison | 100 | 100 | pA | | | 2.2 | mA/A | 1.96 | 95% | Yes | | 57 |
| DC current sources: low values (<= 0.1 mA) | Current generator | Comparison | 1 | 1 | nA | | | 0.3 | mA/A | 1.96 | 95% | Yes | | 58 |
| DC current sources: low values (<= 0.1 mA) | Current generator | Comparison | 10 | 10 | nA | | | 0.3 | mA/A | 1.96 | 95% | Yes | | 59 |
| DC current sources: low values (<= 0.1 mA) | Current generator | Comparison | 100 | 100 | nA | | | 0.3 | mA/A | 1.96 | 95% | Yes | | 60 |
| DC current sources: low values (<= 0.1 mA) | Current generator | Comparison | 1 | 1 | µA | | | 0.04 | mA/A | 1.96 | 95% | Yes | | 61 |
| DC current sources: low values (<= 0.1 mA) | Current generator, multifunction calibrator | Voltage drop across standard resistor | 10 | 10 | µA | | | 11 | µA/A | 2 | 95% | Yes | | 62 |
| DC current sources: low values (<= 0.1 mA) | Current generator, multifunction calibrator | Voltage drop across standard resistor | 100 | 100 | µA | | | 10 | µA/A | 2 | 95% | Yes | | 63 |
| DC current sources: intermediate values (> 0.1 mA to 20 A) | Current generator, multifunction calibrator | Voltage drop across standard resistor | 1 | 1 | mA | | | 13 | µA/A | 2 | 95% | Yes | | 64 |
| DC current sources: intermediate values (> 0.1 mA to 20 A) | Current generator, multifunction calibrator | Voltage drop across standard resistor | 10 | 10 | mA | | | 10 | µA/A | 2 | 95% | Yes | | 65 |
| DC current sources: intermediate values (> 0.1 mA to 20 A) | Current generator, multifunction calibrator | Voltage drop across standard resistor | 100 | 100 | mA | | | 10 | µA/A | 2 | 95% | Yes | | 66 |
| DC current sources: intermediate values (> 0.1 mA to 20 A) | Current generator, multifunction calibrator | Voltage drop across standard resistor | 1 | 1 | A | | | 14 | µA/A | 2 | 95% | Yes | | 67 |
| DC current sources: intermediate values (> 0.1 mA to 20 A) | Current generator, multifunction calibrator | Voltage drop across standard resistor | 2 | 2 | A | | | 18 | µA/A | 2 | 95% | Yes | | 68 |
| DC current sources: intermediate values (> 0.1 mA to 20 A) | Current generator, multifunction calibrator | Voltage drop across standard resistor | 5 | 5 | A | | | 15 | µA/A | 2 | 95% | Yes | | 69 |

Calibration and Measurement Capabilities

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| Quantity | Instrument or Artifact | Instrument Type or Method | Minimum value | Maximum value | Units | Parameter | Specifications | Value | Units | Coverage Factor | Level of Confidence | Is the expanded uncertainty a relative one? | | |
| DC current sources: intermediate values (> 0.1 mA to 20 A) | Current generator, multifunction calibrator | Voltage drop across standard resistor | 10 | 10 | A | | | 15 | µA/A | 2 | 95% | Yes | | 70 |
| DC current sources: high values (> 20 A to 100 A) | Current generator | Voltage drop across standard resistor | 100 | 100 | A | | | 47 | µA/A | 2 | 95% | Yes | | 71 |
| DC current meters: low values (<= 0.1 mA) | Picoammeter | Direct measurement | 10 | 10 | pA | | | 29 | mA/A | 1.96 | 95% | Yes | | 72 |
| DC current meters: low values (<= 0.1 mA) | Picoammeter | Direct measurement | 100 | 100 | pA | | | 2.2 | mA/A | 1.96 | 95% | Yes | | 73 |
| DC current meters: low values (<= 0.1 mA) | Nanoammeter | Direct measurement | 1 | 1 | nA | | | 0.4 | mA/A | 1.96 | 95% | Yes | | 74 |
| DC current meters: low values (<= 0.1 mA) | Nanoammeter | Direct measurement | 10 | 10 | nA | | | 0.3 | mA/A | 1.96 | 95% | Yes | | 75 |
| DC current meters: low values (<= 0.1 mA) | Nanoammeter | Direct measurement | 100 | 100 | nA | | | 0.3 | mA/A | 1.96 | 95% | Yes | | 76 |
| DC current meters: low values (<= 0.1 mA) | Multimeter | Direct measurement | 1 | 1 | µA | | | 0.05 | mA/A | 1.96 | 95% | Yes | | 77 |
| DC current meters: low values (<= 0.1 mA) | Multimeter, multifunction transfer standard | Direct measurement | 10 | 10 | µA | | | 11 | µA/A | 2 | 95% | Yes | | 78 |
| DC current meters: low values (<= 0.1 mA) | Multimeter, multifunction transfer standard | Direct measurement | 100 | 100 | µA | | | 10 | µA/A | 2 | 95% | Yes | | 79 |
| DC current meters: intermediate values (> 0.1 mA to 20 A) | Multimeter, multifunction transfer standard | Direct measurement | 1 | 1 | mA | | | 13 | µA/A | 2 | 95% | Yes | | 80 |
| DC current meters: intermediate values (> 0.1 mA to 20 A) | Multimeter, multifunction transfer standard | Direct measurement | 10 | 10 | mA | | | 10 | µA/A | 2 | 95% | Yes | | 81 |
| DC current meters: intermediate values (> 0.1 mA to 20 A) | Multimeter, multifunction transfer standard | Direct measurement | 100 | 100 | mA | | | 10 | µA/A | 2 | 95% | Yes | | 82 |

Calibration and Measurement Capabilities

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|---|---|---------------------------|--------------------------|---------------|-------|---|----------------|----------------------|-------|-----------------|---------------------|---|------------------------|----|
| Quantity | Instrument or Artifact | Instrument Type or Method | Minimum value | Maximum value | Units | Parameter | Specifications | Value | Units | Coverage Factor | Level of Confidence | Is the expanded uncertainty a relative one? | | |
| DC current meters: intermediate values (> 0.1 mA to 20 A) | Multimeter, multifunction transfer standard | Direct measurement | 1 | 1 | A | | | 14 | µA/A | 2 | 95% | Yes | | 83 |
| DC current meters: intermediate values (> 0.1 mA to 20 A) | Current transducer | Direct measurement | 2 | 2 | A | | | 18 | µA/A | 2 | 95% | Yes | | 84 |
| DC current meters: intermediate values (> 0.1 mA to 20 A) | Current transducer | Direct measurement | 5 | 5 | A | | | 15 | µA/A | 2 | 95% | Yes | | 85 |
| DC current meters: intermediate values (> 0.1 mA to 20 A) | Current transducer | Direct measurement | 10 | 10 | A | | | 15 | µA/A | 2 | 95% | Yes | | 86 |
| DC current meters: high values (> 20 A to 100 A) | Current transducer | Direct measurement | 100 | 100 | A | | | 47 | µA/A | 2 | 95% | Yes | | 87 |
| Capacitance: capacitance and dissipation factor for low loss capacitors | Standard capacitor | Difference measurement | 10 | 10 | pF | Frequency | 1 kHz | 2.5 | µF/F | 2 | 95% | Yes | | 88 |
| Capacitance: capacitance and dissipation factor for low loss capacitors | Standard capacitor | Difference measurement | 100 | 100 | pF | Frequency | 1 kHz | 2.9 | µF/F | 2 | 95% | Yes | | 89 |
| Capacitance: capacitance and dissipation factor for low loss capacitors | Standard capacitor | Difference measurement | 1000 | 1000 | pF | Frequency | 1 kHz | 6.1 | µF/F | 2 | 95% | Yes | | 90 |
| Capacitance: meters | Capacitance bridge, LCR meter | Direct measurement | 10 | 10 | pF | Frequency | 1 kHz | 2.5 | µF/F | 2 | 95% | Yes | | 91 |
| Capacitance: meters | Capacitance bridge, LCR meter | Direct measurement | 100 | 100 | pF | Frequency | 1 kHz | 2.9 | µF/F | 2 | 95% | Yes | | 92 |
| Capacitance: meters | Capacitance bridge, LCR meter | Direct measurement | 1000 | 1000 | pF | Frequency | 1 kHz | 6.1 | µF/F | 2 | 95% | Yes | | 93 |
| Inductance: self inductance, low values (< 1 mH) | Fixed inductor | Direct measurement | 100 | 100 | µH | Frequency | 1 kHz | 1.2 | mH/H | 2 | 95% | Yes | | 94 |

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| Quantity | Instrument or Artifact | Instrument Type or Method | Minimum value | Maximum value | Units | Parameter | Specifications | Value | Units | Coverage Factor | Level of Confidence | Is the expanded uncertainty a relative one? | | |
| Inductance: self inductance, intermediate values ($\geq 1 \text{ mH}$ to 1 H) | Fixed inductor | Direct measurement | 1 | 1 | mH | Frequency | 100 Hz, 1 kHz | 0.22 | mH/H | 2 | 95% | Yes | | 95 |
| Inductance: self inductance, intermediate values ($\geq 1 \text{ mH}$ to 1 H) | Fixed inductor | Direct measurement | 10 | 10 | mH | Frequency | 100 Hz, 1 kHz | 0.22 | mH/H | 2 | 95% | Yes | | 96 |
| Inductance: self inductance, intermediate values ($\geq 1 \text{ mH}$ to 1 H) | Fixed inductor | Direct measurement | 100 | 100 | mH | Frequency | 100 Hz, 1 kHz | 0.22 | mH/H | 2 | 95% | Yes | | 97 |
| Inductance: self inductance, intermediate values ($\geq 1 \text{ mH}$ to 1 H) | Fixed inductor | Direct measurement | 1 | 1 | H | Frequency | 100 Hz | 0.22 | mH/H | 2 | 95% | Yes | | 98 |
| Inductance: self inductance, intermediate values ($\geq 1 \text{ mH}$ to 1 H) | Fixed inductor | Direct measurement | 1 | 1 | H | Frequency | 1 kHz | 0.52 | mH/H | 2 | 95% | Yes | | 98a |
| Inductance: self inductance, high values ($> 1 \text{ H}$) | Fixed inductor | Direct measurement | 10 | 10 | H | Frequency | 100 Hz | 0.22 | mH/H | 2 | 95% | Yes | | 99 |
| Inductance: self inductance, high values ($> 1 \text{ H}$) | Fixed inductor | Direct measurement | 10 | 10 | H | Frequency | 1 kHz | 2 | mH/H | 2 | 95% | Yes | | 99a |
| Inductance: meters | LCR meter | Direct measurement | 100 | 100 | μH | Frequency | 100 Hz, 1 kHz | 1.2 | mH/H | 2 | 95% | Yes | | 100 |
| Inductance: meters | LCR meter | Direct measurement | 1 | 1 | mH | Frequency | 100 Hz, 1 kHz | 0.22 | mH/H | 2 | 95% | Yes | | 101 |
| Inductance: meters | LCR meter | Direct measurement | 10 | 10 | mH | Frequency | 100 Hz, 1 kHz | 0.22 | mH/H | 2 | 95% | Yes | | 102 |
| Inductance: meters | LCR meter | Direct measurement | 100 | 100 | mH | Frequency | 100 Hz, 1 kHz | 0.22 | mH/H | 2 | 95% | Yes | | 103 |
| Inductance: meters | LCR meter | Direct measurement | 1 | 1 | H | Frequency | 100 Hz | 0.22 | mH/H | 2 | 95% | Yes | | 104 |

Calibration and Measurement Capabilities

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|--|--|---------------------------|--------------------------|---------------|-------|---|-----------------|----------------------|-------|-----------------|---------------------|---|--------------------------|------|
| Quantity | Instrument or Artifact | Instrument Type or Method | Minimum value | Maximum value | Units | Parameter | Specifications | Value | Units | Coverage Factor | Level of Confidence | Is the expanded uncertainty a relative one? | | |
| Inductance: meters | LCR meter | Direct measurement | 1 | 1 | H | Frequency | 1 kHz | 0.52 | mH/H | 2 | 95% | Yes | | 104a |
| Inductance: meters | LCR meter | Direct measurement | 10 | 10 | H | Frequency | 100 Hz | 0.22 | mH/H | 2 | 95% | Yes | | 105 |
| Inductance: meters | LCR meter | Direct measurement | 10 | 10 | H | Frequency | 1 kHz | 2 | mH/H | 2 | 95% | Yes | | 105a |
| AC/DC voltage transfer: AC/DC transfer difference at low voltages | Micropotentiometer & LVTVC | Difference measurement | 0.001 | 0.1 | V | Frequency | 20 Hz to 1 MHz | 29 to 2000 | µV/V | 2 | 95% | Yes | Matrix 1 | 106 |
| AC/DC voltage transfer: AC/DC transfer difference at medium voltages | Thermal voltage converter | Difference measurement | 0.2 | 5 | V | Frequency | 20 Hz to 1 MHz | 4 to 60 | µV/V | 2 | 95% | Yes | Matrix 1 | 107 |
| AC/DC voltage transfer: AC/DC transfer difference at higher voltages | Thermal voltage converter | Difference measurement | 5 | 1000 | V | Frequency | 20 Hz to 1 MHz | 7 to 60 | µV/V | 2 | 95% | Yes | Matrix 1 | 108 |
| AC voltage up to 1000 V: sources | Multifunction calibrator, ACV source | AC/DC comparison | 0.001 | 1000 | V | Frequency | 20 Hz to 1 MHz | 10 to 1000 | µV/V | 2 | 95% | Yes | Matrix 3 | 109 |
| AC voltage up to 1000 V: meters | Multimeter, AC voltmeter | AC/DC comparison | 0.001 | 1000 | V | Frequency | 20 Hz to 1 MHz | 10 to 1000 | µV/V | 2 | 95% | Yes | Matrix 3 | 110 |
| AC/DC current transfer: AC/DC transfer difference | Thermal current converter | Difference measurement | 0.001 | 20 | A | Frequency | 20 Hz to 10 kHz | 15 to 110 | µA/A | 2 | 95% | Yes | Matrix 2 | 111 |
| AC/DC current transfer: AC/DC transfer difference | Shunt | Difference measurement | 5 | 20 | A | Frequency | 60 Hz, 1 kHz | 160 to 400 | µA/A | 2 | 95% | Yes | | 112 |
| AC current up to 100 A: sources | Multifunction calibrator, transconductance amplifier | AC/DC comparison | 0.001 | 20 | A | Frequency | 20 Hz to 10 kHz | 50 to 150 | µA/A | 2 | 95% | Yes | Matrix 4 | 113 |
| AC current up to 100 A: meters | AC ammeter, multimeter | AC/DC comparison | 0.001 | 20 | A | Frequency | 20 Hz to 10 kHz | 50 to 150 | µA/A | 2 | 95% | Yes | Matrix 4 | 114 |
| AC power and energy: single phase power at frequency <= 400 Hz | Wattmeter, power converter | Power comparator | 120 | 1200 | VA | Voltage | 120 V, 240V | 45 | µW/VA | 2 | 95% | Yes | | 115 |

Calibration and Measurement Capabilities

| Calibration or Measurement Service | | | Measurand Level or Range | | | Measurement Conditions/Independent Variable | | Expanded Uncertainty | | | | Matrix uncertainty | NMI Service Identifier | |
|--|---|-------------------------------------|--------------------------|---------------|-------|---|----------------------------|----------------------|---------|-----------------|---------------------|---|------------------------|-----|
| Quantity | Instrument or Artifact | Instrument Type or Method | Minimum value | Maximum value | Units | Parameter | Specifications | Value | Units | Coverage Factor | Level of Confidence | Is the expanded uncertainty a relative one? | | |
| | | | | | | Current | 1 A, 5 A | | | | | | | |
| | | | | | | Frequency | 50 Hz, 60 Hz | | | | | | | |
| | | | | | | Power factor | any | | | | | | | |
| AC power and energy: single phase power at frequency <= 400 Hz | Power calibrator, wattmeter, watt converter, watthour meter | Difference measurement | 110 | 2400 | VA | Voltage | 110 V, 120 V, 220 V, 240 V | 120 | µW/Va | 2 | 95% | Yes | | 118 |
| | | | | | | Current | 1 A, 5 A, 10 A | | | | | | | |
| | | | | | | Frequency | 60 Hz | | | | | | | |
| | | | | | | Power factor | 0.5 lead / lag, 1 | | | | | | | |
| AC energy: three phase | Watthour meter | Difference measurement pulse output | 110 | 550 | VA | Voltage | 110 V | 120 | µWh/Vah | 2 | 95% | Yes | | 119 |
| | | | | | | Current | 1 A, 2.5 A, 5 A | | | | | | | |
| | | | | | | Frequency | 60 Hz | | | | | | | |
| | | | | | | Power factor | 0.5 lead / lag, 1 | | | | | | | |
| High DC voltage: sources | DC kilovolt source | Comparison | 1 | 100 | kV | | | 0.1 | mV/V | 2 | 95% | Yes | | 120 |
| High DC voltage: meters | DC kilovolt meter | Direct measurement | 1 | 100 | kV | | | 0.1 | mV/V | 2 | 95% | Yes | | 121 |

Calibration and Measurement Capabilities

| Calibration or Measurement Service | | | Measurand Level or Range | | | Measurement Conditions/Independent Variable | | Expanded Uncertainty | | | | Matrix uncertainty | NMI Service Identifier | |
|-------------------------------------|------------------------|---------------------------|--------------------------|---------------|-------|---|--------------------------------------|----------------------|-------|-----------------|---------------------|---|------------------------|------|
| Quantity | Instrument or Artifact | Instrument Type or Method | Minimum value | Maximum value | Units | Parameter | Specifications | Value | Units | Coverage Factor | Level of Confidence | Is the expanded uncertainty a relative one? | | |
| High DC voltage: ratios | Resistive divider | Comparison | 1000:1 | 100000:1 | V/V | | | 0.1 | mV/V | 2 | 95% | Yes | | 122 |
| AC high voltage: ratio error | Potential transformer | Difference measurement | 0 | 0.02 | | Voltage | 1 kV to 100 kV | 8E-05 | | 2 | 95% | No | | 123 |
| | | | | | | Frequency | 60 Hz | | | | | | | |
| AC high voltage: phase displacement | Potential transformer | Difference measurement | 0 | 30 | mrad | Voltage | 1 kV to 100 kV | 60 | μrad | 2 | 95% | No | | 123a |
| | | | | | | Frequency | 60 Hz | | | | | | | |
| High AC current: ratio error | Current transformer | Difference measurement | 0 | 0.02 | | Current | 5 A to 5 kA | 6.5E-05 | | 2 | 95% | No | | 124 |
| | | | | | | Frequency | 60 Hz | | | | | | | |
| High AC current: phase displacement | Current transformer | Difference measurement | 0 | 30 | mrad | Current | 5 A to 5 kA | 30 | μrad | 2 | 95% | No | | 124a |
| | | | | | | Frequency | 60 Hz | | | | | | | |
| High DC current: sources | Current source | Voltage drop across shunt | 100 | 1000 | A | | | 0.4 | mA/A | 2 | 95% | Yes | | 125 |
| High DC current: meters | Current meter | Direct measurement | 100 | 1000 | A | | | 0.4 | mA/A | 2 | 95% | Yes | | 126 |
| Phase angle: sources | Phase source | Difference measurement | 0 | 360 | ° | Voltage | 5 V to 100 V with equal input levels | 0.02 | ° | 2 | 95% | No | | 127 |
| | | | | | | Frequency | 60 Hz to 50 kHz | | | | | | | |

Calibration and Measurement Capabilities

| Calibration or Measurement Service | | | Measurand Level or Range | | | Measurement Conditions/Independent Variable | | Expanded Uncertainty | | | | Matrix uncertainty | NMI Service Identifier | |
|---|--|---|--------------------------|---------------|----------|---|--------------------------------------|----------------------|----------|-----------------|---------------------|---|------------------------|-----|
| Quantity | Instrument or Artifact | Instrument Type or Method | Minimum value | Maximum value | Units | Parameter | Specifications | Value | Units | Coverage Factor | Level of Confidence | Is the expanded uncertainty a relative one? | | |
| Phase angle: meters | Phase meter | Direct measurement | 0 | 360 | ° | Voltage | 5 V to 100 V with equal input levels | 0.02 | ° | 2 | 95% | No | | 128 |
| | | | | | | Frequency | 60 Hz to 50 kHz | | | | | | | |
| RF power: calibration factor on coaxial lines | Power sensor, thermistor (50Ω , N) | DC substitution, reflection measurement | 0.8 | 1 | | Power | 0.1 mW to 10 mW | 1.8 to 2.2 | % | 2 | 95% | Yes | | 129 |
| | | | | | | Frequency | 10 MHz to 18 GHz | | | | | | | |
| Lumped impedance: resistance (R) | Termination resistor, on APC-7 coaxial, one-port | RF impedance analyzer | 33 | 100 | Ω | Frequency | 10 MHz to 60 MHz | 0.15 | Ω | 2 | 95% | No | | 130 |
| Lumped impedance: capacitance (C) | Termination resistor, on APC-7 coaxial, one-port | RF impedance analyzer | 1 | 100 | pF | Frequency | 10 MHz to 60 MHz | 0.019 | pF | 2 | 95% | No | | 131 |

Chinese TAIPEI, CMS (Center for Measurement Standards)**AC/DC Voltage transfer uncertainty matrix: Matrix 1**

Internal NMI service identifier: 106, 107 and 108

| | 20 Hz | 40 Hz | 60 Hz | 1 kHz | 10 kHz | 30 kHz | 100 kHz | 300 kHz | 500 kHz | 800 kHz | 1 MHz |
|--------|-------|-------|-------|-------|--------|--------|---------|---------|---------|---------|-------|
| 1 mV | 200 | 200 | 200 | 200 | 200 | 300 | 700 | 1000 | 1300 | 1600 | 2000 |
| 2 mV | 150 | 150 | 150 | 130 | 130 | 150 | 200 | 300 | 500 | 700 | 1000 |
| 5 mV | 110 | 110 | 110 | 100 | 100 | 100 | 140 | 160 | 220 | 270 | 400 |
| 10 mV | 90 | 90 | 90 | 80 | 80 | 80 | 120 | 140 | 180 | 230 | 300 |
| 20 mV | 70 | 70 | 70 | 70 | 70 | 70 | 90 | 110 | 140 | 180 | 240 |
| 50 mV | 40 | 40 | 40 | 40 | 40 | 40 | 60 | 70 | 90 | 110 | 130 |
| 100 mV | 29 | 29 | 29 | 29 | 29 | 29 | 40 | 50 | 70 | 90 | 120 |
| 200 mV | 13 | 13 | 13 | 13 | 13 | 13 | 15 | 28 | 40 | 50 | 60 |
| 0.5 V | 10 | 10 | 10 | 10 | 10 | 10 | 13 | 24 | 40 | 50 | 60 |
| 1 V | 7 | 7 | 7 | 7 | 7 | 7 | 10 | 20 | 30 | 40 | 50 |
| 2 V | 5 | 5 | 5 | 4 | 4 | 4 | 8 | 18 | 30 | 40 | 50 |
| 4 V | 7 | 7 | 7 | 7 | 7 | 7 | 10 | 20 | 30 | 40 | 50 |
| 10 V | 10 | 10 | 10 | 10 | 10 | 10 | 13 | 24 | 40 | 50 | 60 |
| 20 V | 13 | 13 | 13 | 13 | 13 | 13 | 15 | 28 | 40 | 50 | 60 |
| 40 V | 15 | 15 | 15 | 15 | 15 | 15 | 17 | 30 | - | - | - |
| 100 V | 18 | 18 | 18 | 18 | 18 | 18 | 23 | - | - | - | - |
| 200 V | 27 | 27 | 27 | 27 | 27 | 27 | 40 | - | - | - | - |
| 400 V | 40 | 40 | 40 | 40 | 40 | 40 | 50 | - | - | - | - |
| 1000 V | 50 | 50 | 50 | 50 | 50 | 60 | - | - | - | - | - |

Chinese TAIPEI, CMS (Center for Measurement Standards)**AC/DC Current transfer uncertainty matrix: Matrix 2**

Internal NMI service identifier: 111

| | 20 Hz | 40 Hz | 60 Hz | 1 kHz | 5 kHz | 10 kHz |
|--------|-------|-------|-------|-------|-------|--------|
| 1 mA | 23 | 23 | 23 | 23 | 40 | 70 |
| 2.5 mA | 23 | 23 | 23 | 23 | 40 | 70 |
| 5 mA | 20 | 20 | 20 | 20 | 40 | 60 |
| 10 mA | 18 | 18 | 18 | 18 | 30 | 50 |
| 20 mA | 15 | 15 | 15 | 15 | 28 | 40 |
| 30 mA | 18 | 18 | 18 | 18 | 30 | 50 |
| 50 mA | 20 | 20 | 20 | 20 | 40 | 60 |
| 100 mA | 23 | 23 | 23 | 23 | 40 | 70 |
| 200 mA | 25 | 25 | 25 | 25 | 50 | 70 |
| 300 mA | 27 | 27 | 27 | 27 | 50 | 80 |
| 500 mA | 29 | 29 | 29 | 29 | 60 | 80 |
| 1 A | 30 | 30 | 30 | 40 | 60 | 80 |
| 2 A | 30 | 30 | 30 | 40 | 60 | 90 |
| 3 A | 40 | 40 | 40 | 50 | 70 | 90 |
| 5 A | 50 | 50 | 50 | 60 | 80 | 100 |
| 10 A | 50 | 50 | 50 | 60 | 80 | 110 |
| 20 A | 50 | 50 | 50 | 70 | 90 | 110 |

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AC Voltage uncertainty matrix: Matrix 3

Internal NMI service identifier: 109 and 110

| | 20 Hz | 60 Hz | 10 kHz | 30 kHz | 100 kHz | 500 kHz | 1 MHz |
|--------|-------|-------|--------|--------|---------|---------|-------|
| 1 mV | - | 1000 | 1000 | 1000 | - | - | - |
| 2 mV | - | 800 | 800 | 800 | - | - | - |
| 5 mV | - | 500 | 500 | 500 | - | - | - |
| 10 mV | - | 300 | 300 | 300 | - | - | - |
| 20 mV | - | 100 | 100 | 200 | - | - | - |
| 50 mV | - | 70 | 70 | 100 | - | - | - |
| 100 mV | 70 | 40 | 40 | 40 | 100 | 300 | 500 |
| 200 mV | 40 | 30 | 30 | 40 | 60 | 300 | 400 |
| 0.5 V | 30 | 20 | 20 | 30 | 40 | 200 | 300 |
| 1 V | 20 | 10 | 10 | 20 | 30 | 200 | 300 |
| 2 V | 30 | 20 | 20 | 30 | 40 | 200 | 300 |
| 4 V | 40 | 30 | 30 | 40 | 50 | 200 | 300 |
| 10 V | 40 | 30 | 30 | 50 | 60 | 200 | 300 |
| 20 V | 50 | 40 | 40 | 60 | 70 | - | - |
| 40 V | 60 | 50 | 50 | 70 | - | - | - |
| 100 V | 70 | 60 | 60 | 80 | - | - | - |
| 200 V | 70 | 60 | 60 | 80 | - | - | - |
| 400 V | 80 | 70 | 70 | 90 | - | - | - |
| 1000 V | 100 | 80 | 80 | 100 | - | - | - |

Chinese TAIPEI, CMS (Center for Measurement Standards)**AC Current uncertainty matrix: Matrix 4**

Internal NMI service identifier: 113 and 114

| | 20 Hz | 60 Hz | 1 kHz | 5 kHz | 10 kHz |
|--------|-------|-------|-------|-------|--------|
| 1 mA | 50 | 50 | 50 | 70 | 120 |
| 10 mA | 50 | 50 | 50 | 70 | 100 |
| 20 mA | 60 | 60 | 60 | 80 | 110 |
| 50 mA | 70 | 70 | 70 | 90 | 120 |
| 100 mA | 80 | 80 | 80 | 100 | 140 |
| 300 mA | 90 | 90 | 90 | - | - |
| 1 A | 100 | 100 | 100 | - | - |
| 2 A | - | 100 | 100 | - | - |
| 5 A | - | 120 | 120 | - | - |
| 10 A | - | 150 | 150 | - | - |
| 20 A | - | 150 | 150 | - | - |